Notebook, N-93-04-05

This notebook covers the period April-October 1893. It was used primarily by an unidentified experimenter, probably Joseph W. Harris, for notes and calculations regarding the bricking of iron ore concentrate, ore assays, and other chemical analyses. There are also notes, drawings, and calculations by Edison regarding ore separation experiments. The pages are unnumbered. Approximately 90 pages have been used.

N-93-04-05

XE-172

7.05
25
4
11.30 705

70L 705
425
1130

705

4.30
30
500.
14 125

14
11.30
14
11.30
10.30
21.00
3 20

5
11.35
10 35
10 35
37.45

3

11

/ 10 35
30

3

105 / 74.0 5

53

2
2.10
52
2.6 74 5

105
171
735
105
17.85
53
78.38

11 40
15 35
10 30
14 05
14 05
14 05
105 05
20
21 00

6.250

April 3 - 1893

Assay of copper wire for estimating purity & weight in Blanchette's f.p.

Standard Solution of KCN solution

Price of C.P. Copper, washing 30.5 mg, dissolved in HNO_3 (NH_4OH) added, and titrated with KCN.

8.5 cc - 212.5 cc - 2000 cc

6.2 cc - 74.9 - 12.7 cc = 2000 cc of cupric tetrammine

1 cc KCN = 0.757 mg. cu.

3 grams of well ground & mixed sample digested in HNO_3

Platinum crucible weighs 22.5071 grams
" " + CuO " 22.8100 "
CuO weighs 0.3029 grams
contains 79.85 % of cu
which is 4.84 % cu in m

~~43.2 cc = 36.5 mg cu~~

~~[illegible] = 000 0.106~~

.104 : 30.29
79.85
151.45
242.52
272.61
41.03
.2418.5765 : 242 mg

50 mg = 1%
50 | 241.8765 (4.83)
200
418 4.84
400
18.8
150
367

Redetermination of Cu in Schuyler mine dus, by electrolysis

5 grams used, digested in HNO_3, silica residue treated with H_2SO_4 + HFl to drive off any copper silicate that might be formed. After evaporated till all HFl had been expelled, balance added to make solution. Filtered, made neut. with NH_4OH, HCl added. Treated with H_2S for washing. Digested in HNO_3 + H_2SO_4, heated until all HNO_3 had been expelled + H_2SO_4 solution was nearly dry. Diluted Cu SO_4 in H_2O & heated. Electrolysis with about 1/4 amp. for 24 hrs. (Amount of current passed later)

Pt cathode weighs 5.699 grams
9 mg. cu
14 mg. cu
3
7

April 8th 1893
Assay of Stearic Acid
for W. H. Mullen

1 gram used.
13.9 cc
25.1 cc
11.2 cc
.1
11.1 cc 1 cc = 0.080319 grams
11.1
80319
80319
80319
.89.25409

= 89.25% pure

April 17th 1893

Assay of Stearic Acid for W. H. Mullen

1 gram used

19.3 − 30.2 = 10.9 − .2 = 10.7 cc
= 85.94%

April 21st

Assay of Stearic Acid for W. H. M.
14.7 cc − 3.6 − .2 = 11.1 = 10.9 cc =
87.54%

Qualitative assay of tails of Ogden on gives the following

Contains

no			
mercury	Uranium		Iron
lead	Cerium		Copper
silver	Zinc		Arsenic
Bismuth			Phosphorus
Cadmium			Silica
			Titanium
			Alumina
Rhodium			manganese
Osmium			Nickel & Co. small
Ruthenium			Vanadium "
Gold			Tungsten trace
Platinum			
tin		Could find no	
Iridium		molybdenum	
antimony			
selenium			
tellurium			
nickel			
Tantalum			
Chromium			
beryllium			
Gallium			

Experiments with H. cylinders using the various salts for a base.

Combinations of various salts with sulphur.

#1 Sodium meta phosphate melts at red heat but still contains a little water as liberated gas cracked on cooling

#2 Soda meta phosphate + yeast where Soda orthophosphate, melts at a red heat

#3, fused Sulphide of Soda

#4 fused Meta phosphate of Soda and Sulphur. (Sulphur volatilizes completely)

#5 [illegible] of meta phosphate of soda, and [illegible]

#6 Heya meta-phosphate of soda without oil, or substance, [illegible] red heat to melt it.
According, heat to fuse

7 mixture of sulphate of soda, & soda aluminate

#8 Na_2S & oxide of zinc

#9 Neutral Stearate of soda & soda sulphide.
This mixture gave a black mass due to reduction & separation of carbon from Stearic acid. If black mass is separated & heated to a red heat it turns yellow, which at a bright red heat fuses (see #10.)

#10 fused portion of #9

#11, fused Na_2S + a little Stearic acid.
Carbon separates

#12 20 grams Na_2S
2 " Stearic Acid
Sulphide of soda melted first, after all was fluid & most of H_2O evaporated, Stearic added, mixed upon it, & immediately poured in small dish when [illegible] fused, a lower one containing Na_2S & some Stearic, & upper one containing all Stearic. upper layer poured off after lower one had sufficiently cooled

acid [illegible] [illegible]

13 Mixture of KCN + Na_2S

14 - Na_2S + Calcium Stearate

15 - Na_2S + Stearic Acid
Stearic acid separates on cooling

16 - 10 grams Na_2S, 1/4 gram Stearic Acid

17 10 grams Na_2S 1/2 gram Stearic Acid

18 - 7/2 grams Na_2S 1/4 gram Stearic acid

#19 10 Na_2S 1/4 Stearic Acid, same as 16.

0.080319

Prof. Albert Ad. L. Walter Miller

#9	[illegible]	73.6	-0.1 = 12.7	= 25.93%
#10	52.1	63.4	-0.1 = 11.2	= 89.95%
#11	[illegible]	80.4	-1 = 11.0	88.35%
#12	25.3	[illegible]	-1 = 11.2	= 89.95%
#13	51.0	61.7	-1 10.1	= 85.7%
#14	61.6	72.9	-1 = 11.2	90.96%
#15	53.5	65.0	-1 11.4	91.56%

On the manufacture of CCl_4 + Cl_2

Chlorine gas was passed through CS_2 + the mixed gas + vapor passed through a red hot iron tube the following reaction taking place -

$$CS_2 + Cl_2 = CCl_4 + S_2Cl_2$$

The gases from the iron tube passed through a condenser cooled with ice

The O_2 - 250 grams

Hot 9.60 cc = 100 grams -

Cl_2 - 375 grams -

C-3-2
H
H
H

Assay for Phos of magnetite
as received from
R. H. Cadwalader

20 grams used, (sample by
Mr. Silvey)

= 0.114 %

Examination of a white alloy for Mr. Kennedy.

Sp. G. 9.6

Dissolved portion in HNO_3, evaporated to dryness, added H_2O, filtered. Became very slight turbid, which may be due to a trace of tellurium, or $AgCl$.

Added HCl to a portion, gave a heavy white ppt., which turned slightly grey in daylight, as Ag.

Filtered off ppt., added H_2S, gave a dark brown color.

no lead.

no measurement.

contains copper.

Filtrate from H_2S boiled, + NH_4OH added no ppt.

$(NH_4)_2S$ added dark color produced no manganese.

$(NH_4)_2S$ produced a black ppt. soluble in HNO_3

$(NH_4)_2CO_3$ + HH –

in HCl solution of $NiCO_3$ ammonia produces Ellis' purple color, similar like Ni.

H_2S HH in acid amplified solution in $(NH_4)_2S$ x.

Mass of M-Spring –
Weight in air 0.2707 grams.
" " water 0.2445 "
Sp. G.: 10.332

E – Spring –
Weight in air 108 mg.
" " H_2O 98.8 "

Quantitative assay of a sample of Bismuth metal for Silver, Copper & Nickel.
weight for each det., 50 milligrams.

Dissolved in dilute HNO_3 applied by HCl filtered & discarded in H_2S & separate solution by

Cathode weight 5.6788 mg

Ag =	5.7207 - 5.6708		0.379
	5.623 - 5.6228		.38
			40.9

for Cu determination sample weighing 72.2 mg used.
Cu = 5.670

Ni of HCl sample used.

32 mg weight of ofpiece —

5.6811	5.7096	22.5
5.622	5.6920	4
5.6218	5.6863	1.3
		27.8

Weight of filt. paper 0.2252
" " Ash 0.0342

Edw. Sh.
26. Aug.

Determination of Resin in
[illegible]

100 grams dissolved in methyl
alcohol (100 cc.

dissolved 50 grams resin
in 200 grams of Benzene Chl

Assay for Pt. year of 1875 –
[illegible]

1.09 grs. ore

Carbon 11.5.11 Rhos.

Wt. [illegible] of solid residue left on sluice after washing it a second time

weight of Pt. crucible & lids
39.0226 grams

weight of crucible & lids with the
33.1176

weight of platinum 4.0944

weight of crucible & residue after ignition
29.4896 grs.
29.0226
.4644

4.0944) 0.4644 ozs. (11.34
4.0944
37860
40944
100160
122832
173280

= 11.34% of carbon residue

Weight of sample of brick as are
42.333 grams
Drying at 100 F.
May 26th 1893

~~The~~ June 1st, 9.30 Am –
44.700
42.333
2.367

42.333 / 236.700 (5.59
211665
250350 5.6
211665
38685

= 5.6% water absorbed in 135 hours
= 5 days, + 15 hours.

Weight of brick #6, of Series B –
169.250 grams.
put in H2O at 9.35 Am, June 1st
for 24 hours.
(was left in water for 47 hours)
at the end of which, it was removed,
dried between blotters, + weighed

173.400
169.250
4.150

169.250 / 4150000 (2.44
3385000
7650000
6770000
6800000

This brick is made of 30 lbs slag, acid tar, + 70 lbs Crude Lima Petroleum, To 2240 lbs one, was baked at 500° F for 60 minutes.
It was placed in a tumbler of water for 47 hours, before soaking it weighed 169.250 grams, after 47 hours, it weighed 173.400 grams an increase, due to water of 2.44%

June 3rd 1893

Specific of Ottawa Sand

" "

weight of graduate 47.656 grams.
55.088
7.3 cc
7.432

7.3 / 7.432 (1.018
73
182
73
590

Separation of a sample of "Special sand" received from Ogden June 3rd 1893. Supposed to be larger than 30 mesh.

Weight of sample of sand 910 grams.

Weight of 40 mesh which I screened out 198 "

Weight of 90 mesh which I screened out 75.75 "

gives
21.76 % of 40 mesh
and 8.32 % of 90 "

June 7th 1893

Assay for Phos of Fertilizer - Bulk

5 grams digested in HCl

= 0.1256 grams pyrophosphate

0.1256

.063

.7768

.7768

= .0417 % P

5 - c.c. full vapor drawn at 100°C, cooled in desiccator, weighed, weigh 2.827 grams

" weigh .5654 "

.6913

.1259

Mass of lamp ~~flask~~ containing gas 23.617

~~Flask~~ 72.5 gm
7.5
1.9

7.5 74.4
7.4 76.4
1.9 2.0

1.9
1.9
2.0
5 lb of
1.933 gm

Weight of tube and bowl full of water
243.1313 lb grains

Weight of tube – 14.353
228.7783

1.933 cc of gas

Determination of Burns Creek #2088-#2115
for Phos.

5 grams used

0.6535 grams wt. of ppt. + Paper
0.5654 " " " paper
0.0881

1.43 mg P =
0.029 phos.

Determination of Castorline Creek
#1-21 - fire for Phos.

5 grams used

0.6540 weight of ppt + filter paper
0.5654 " " " filter paper grams
0.0886 weight of ppt in milligrams
= 1.44 mg P
= 0.030% Phos.

Determination of Burn Chrs.
Phos. 2.116 - 2.124 mg.

Squares used.

Weight of yellow salt 68 gms
" " yellow ppt 5654
0.1236 mg

.0.1236
1.63
3708
7416
.0201468 = 2 mg phos.
0.040% phos.

Ep 2 mg.

59.5833
72.5602 12.9769
12.9769

Wt of crucible 20.5741 grams
" " + ppt. 20.5900
.1159

= .1600 =
0.329% TiO_2
= 0.195% Ti

83.90510 24.4ce
57.5815 24.4ce
26.3135

24.4 / 26.3135 (1.0) 8
24.4444
1913
1708
2050

24.4 / 26.3135 (1.078)
24.4444
1913
1708
2055
1952
1030

Assay of Castelbine's Ore -

67 - 72

5 grams -

Weight of filter Paper 0.5654

Wt. of ppt + Paper 5.P5.1 mgs

" " Paper 5654

1197 mgs

73 - 81

5 grams -

632 mg -

65

19.7
1.63
591
1182
197
31.11 1

#1-6 = .502

weight of filter effect = .617
.502
.115

.115
1.63
345
690
115
.00187.45 = 1.9 mg
3 f

= .0385% phos - 1-6

1-9

#1

Concentrates 15.75 = 10.6 fe

Tails 120.5 = 14.72 fe

Samples

	Tails	Conc	Fe 3O4	Fe
#1	261	218	83.5	60.3.6
1-Tailing 2	195	20.5	70.5	7.6
2-Conc 3				
2-Tails 4	100	5	5	3.6
3-Conc 5				
3-Tails 6	200	7.5	3.75	2.7
7				
8				
9				
10				
11				
12				
13				
14				

1

assay this 90 mesh -

1st Run Conc.
1st " Tails

2nd Run Tails

Samples ground to 60 mesh -

	weight	weight	% Fe3O4	Fe
1 Conc	100	69.5	69.5	50.3
1 Tails	195	20.5	10.5	7.6
2 Conc	100	63	63	45.6
2 Tails	100	5	5	3.6
3 Conc	100	58	58	42
3 Tails	200	7.5	3.75	2.7
1 Conc	100	70	70	50.7
1 Tails	100	3.5	3.5	2.53
2 Conc				
2 Tails	100	2.5	2.5	1.8
3 Conc				
3 Tails	100	1.5	1.5	1.08
Avg Conc 1-2-3	100	66.5	66.5	48.1

Average of Conc - 1-2-3 - Fe

100 grams ore - 65 grams Fe3O4 = 65% = 47%

No	Weight Sands	Weight Fe_3O_4	% Fe_3O_4	% Fe
1st A	1.68	64.75	64.75	46.9

$\frac{5.6}{3.6}$
$\frac{2.0}{}$

Experiments new Bar Mag—

1st Run Ex A.

had parting board $1\frac{1}{4}$ inches but this made poor Conc -

Conc A 46.9 ~~Ellis & Spencer~~
Tails A 3.07

Removed A & run it again
Expmt B set parting board 3/4 from O. this gave better Concentrate

Conc B 53.75
Tails B 5.8

Expmt C
now rerun Tails B setting parting board at $1\frac{1}{4}$
Assay Tails C is - 3.6

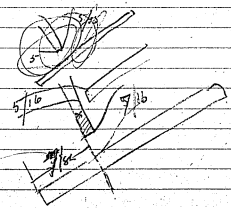
Expt D - Rerun 1st of C with board $2\frac{1}{4}$ -
there was more Conc in Conc of D than C but poorer
Tail 1.8 but only 1.3 ~~this is poor~~

2 lin ft Rate = 5/16 Slot opening

Solid Spencer

Now put Conc B C + D together & it assays mixed — 46.33.

found a leak from tails into Conc —



above is measurement for Experts starting at E —

D was much higher of X

W. heavy dropped down an inch to try experts E

1st Run Expmt - E
Board 5/8 from Zero -
Conc
Tails - 5.1

Expmt F Board 1 1/8 from Zero
Conc
Tails 3.43
This could have board 1 5/16 + be ok -

Expmt G Board 2"
its rather too close will rerun
at 1 7/8 but assay before rerun
Conc of G
Tails of G = .9

H is E F + G mixed Conc
50.13 These good enough

Experiment I. Zero is plumbed from free magnet Sour.

Board 5/8 from Zero

Conc

Tails

Experiment J Board 1 5/16 -

Conc -

Tails

Experiment K Board 1 7/8.

Conc 27.14

Tails - .94 old scale 1.14 fine scale

Experiment L (I J + K Conc together)

Conc fine scale - 52.9

OK for 14 mesh Crude

1.14 Good - 52.9

50 mesh stuff assaying 41.5

Experiment M

1st Run Board 5/8 –

Conc 55.33

Tails – 13.46.

The line is not so sharp as with 14 mesh – board screen go to ½ & give better Conc.

Experiment N.

Board 1 inch

Conc 57.33 –

Tails – 4.34.

Expmt O.

Going to remun a fresh lot
50 mesh. —

Board $\frac{1}{4}$ inch
Cones' bx $\frac{1}{8}$ x 62 better
parting board $2\frac{1}{2}$ @ 3" too high

Expmt P. Board #/2

Q Board 1 inch
only took Q tails + O P Q Cu
Combined —

Cone 55-74
Tails — 4.2

of stuff in Cone 74% will blow
out —

on trying to rerun 55.74
Core with present Condition
of angle plate the as on
page 50 - Magnet
Stick Core + wont let it
run am going to set up

much higher at X

+ find out now sticking point

We have set

much higher

from page 50 - + find out
dont stick (1-2) 55.7 Stuff

We now start with 41 % crude 50 -

Experiment No 1 Board set - negative 1/4 (12)

1/4 inch back of Zero to right looking towards stock room.

No 2 Rerun Tails 1/4 board

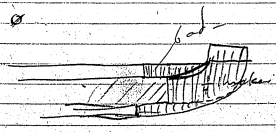
No 3 3rd Run We need assay tails + the 3 time logs.

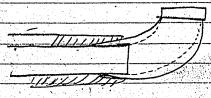
Conc = 39.07.

Tails - 6.23 -

Note - must have brass screws in wood on side of magnets.

Parting brass must be an angle not to 2 ½ inches too high -





Note
July 30, 1893 is Sunday
" 30, 1894 is Monday
MWB

Monday Eve 30th July
Tests with new brass adjusting devices

1 1/2 up 5/16 opening
parting board Neg 5/8

Core 57.5
Tails – 29.9

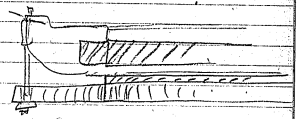
Rerun Tails

~~1/2~~ 9 inch down from 1 1/2
1/4 opening parting board 1/4 Neg 5/16
Core – 58.28
Tails – 19.25

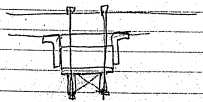
2nd Rerun or last run

1/4 more down or 1 1/4 down from 1st run
3/16 opening – parting board – 1/2 Neg
Core 55.46
Tails – 6.88 2nd last 6.15

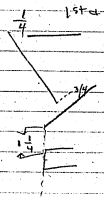
Note - wire on mag saya inch & half
in middle tape flared down
Exposes wire to iron core twill
Cross.



board to support.



Wednesday



1st Run 3/4 neg

2nd 1/4 neg - 1/4 opening Top shaved
leave bottom 3/16
on 2nd

slot above 1/8 opening

1 1/4 pos

Tacks 42.5 grams Silica
1.4 " grams

.04544
4544
.7728

28.55 : 30 x 100 x 7.72

30) 2855.000 (95
270x
150
150

30) 2140.000 (74.66
210
140
120
200

30) 2495.000 (83.14
240x
95
90
50
30
20

60.09
1158
60.2058

53.57
4778
54.0478

1175,
53.2

1228.2) 53 20.0000 (4.3 9
49128x
40720
36846
36740

Magnetic assay of ore treated with a blast of air three times

Concentrate - (after magnetic separation) gave 68.41 % fe -

Mugwump gave 60.81 % fe -

samples were ground up to 90 mesh

Oct 26 -

Magnetic assay of Core
30 grams used -
28.55 grams Fe_3O_4 = 68.78 % Fe

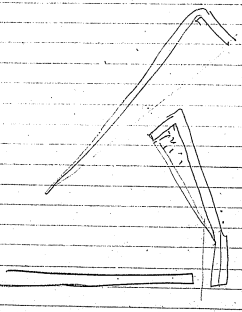
Magnetic assay of mugwump
30 grams used -
24.95 grams Fe_3O_4 = 60.21 % fe

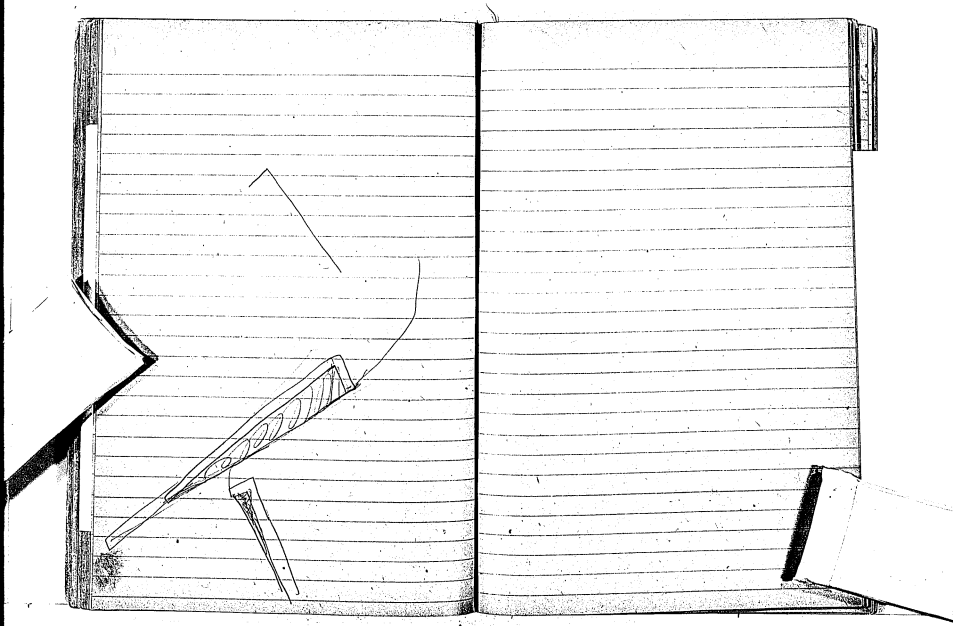
[illegible] Fe_3O_4
from magnetite,
11 magnetite per cubic 53.2 [illegible]
Fe_3O_4 weighs 1175 grams

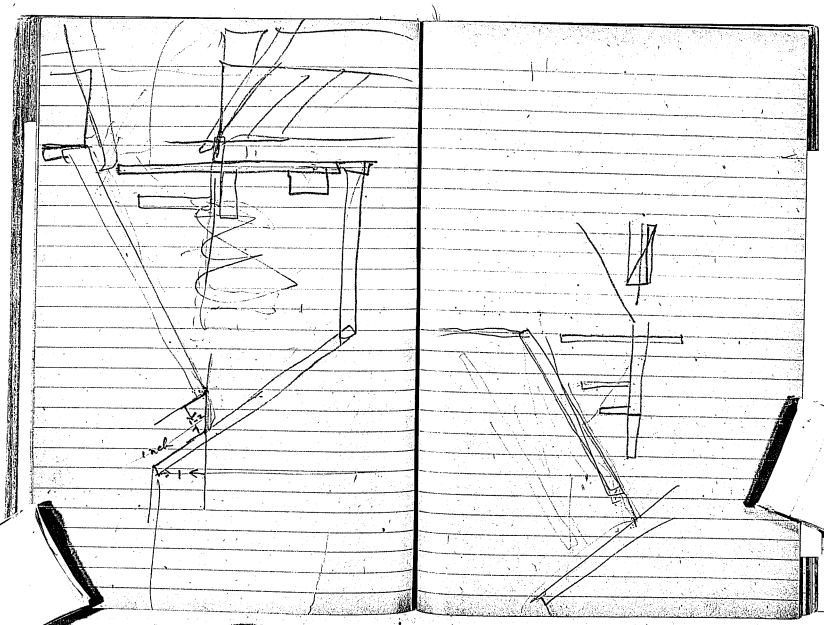
assay of above magnetite
30 grams used
22.4 ÷ Fe_3O_4 = 54.05%

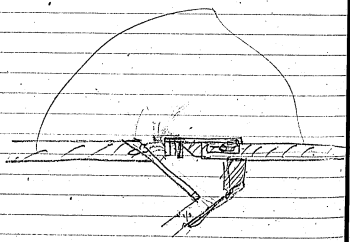
10.35

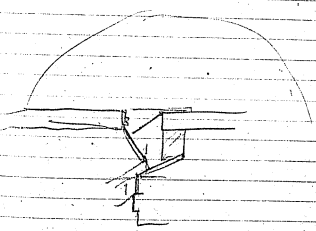
14.05
11.40
14 14.30
23
5.35
10.35
23.30
10.3.175
3
2






1 rad

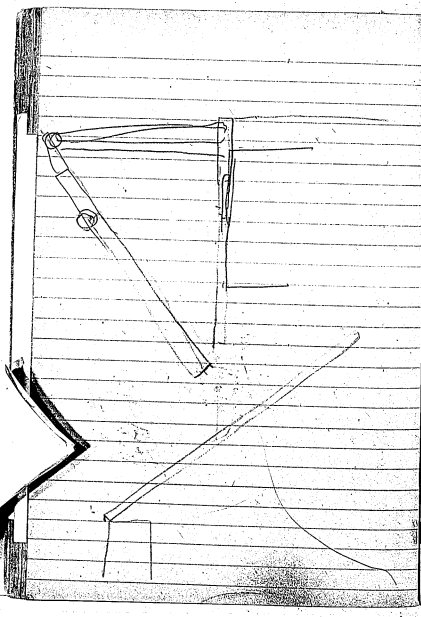




14.05
11.40
14.30
14.05
10.35
10.35
23.30
99.

14.5
11.40
15.
23
10.35
69.20

14.35
11.40
15.
14
10.35
05.40



24 — 3/16

5 ft wide

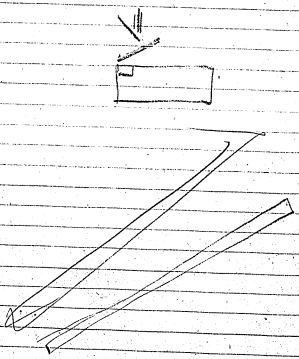
1 ft 5 inches

62
7
434

144
5
720
40
2880 / 16

1728) 2880 (1
1728
1520
1368
1521

450
16
2700
450
7200
16
43200
7200
115200



$$\begin{array}{r} 12 \\ 6 \\ \hline 72 \\ 60 \\ \hline 432^{0} \end{array} \qquad \begin{array}{r} 125 \\ 6 \\ \hline 750 \\ 60 \\ \hline 4500^{0} \end{array}$$

0.454 mg

6.257 1.080319
11.6 1.06
2 541914
803190
0.857304

.100
.400

9.5 Boulder
8 mg

7212
7212 | 800.0000 (1.1
7201
800
720
80
63.4
16
40.8 mg ag 79.4

79.4 | 1600.000 (20.16
1588
1200
794
5060

11.1 11.11 82.0
20.16 2.24 8.9 cm
666 8.87
111
2220
223776

50 mg ale

82 ag

1385 tons / 55200

88 tons hour.

65) 26080 (41. tons
260
800
23.

44
32.

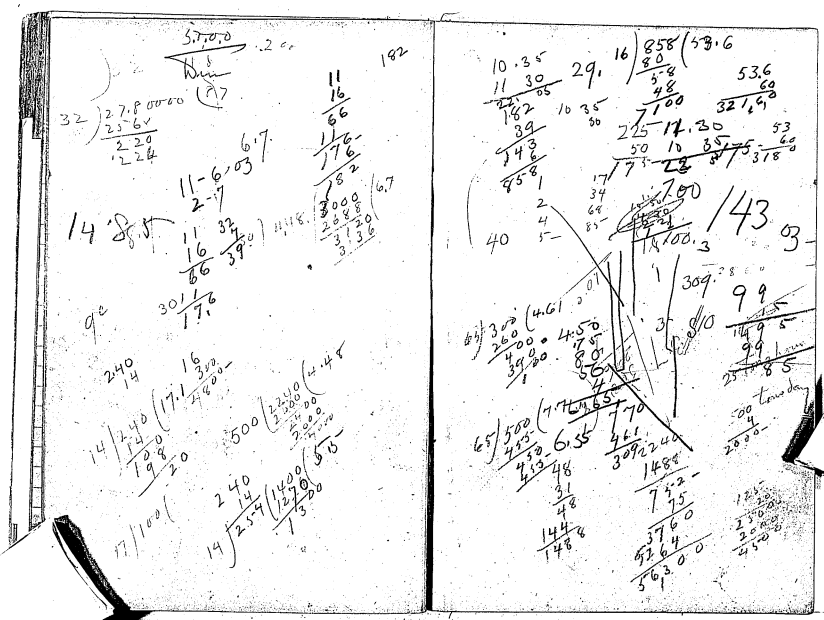
52
31
5-2

31/50 156
155 0 161 2

2240) 75360 (33
6720
8160
6720
1440

2240
1612
628
1 20
1256 0
628 0
75360
7100

88
57
440

335
20
6701
4
268 0 / 6000 / 2

31-
20.